*** ABSTRACT ONLY ***

Second International Conference on Fire Research and Engineering (ICFRE2)

10-15 August 1997

National Institute of Standards and Technology
Gaithersburg, Maryland USA

Organized by

National Institute of Standards and Technology
Gaithersburg, MD, USA

Society of Fire Protection Engineers
Boston, MA, USA

2nd International Conference on Fire Research and Engineering

10-15 August 1997
National Institute of Standards and Technology

Simulation of Fires with Radiative Heat Transfer

William E. Mell, Howard R. Baum and Kevin G. McGrattan

Abstract

In large fires a substantial fraction of the chemically generated heat is transferred by thermal radiation. For fires in an enclosure, radiative heat transfer is particularly important in terms of fire spread. The dynamics of highly sooting fires in unbounded domains may also be strongly influenced by thermal radiation. Radiative heat transfer models which include the effects of absorption by soot and gaseous products are therefore an important component of fire simulations. Most field model based simulations of fires use computationally expensive thermal radiation models. Thus simulations which include thermal radiation often do so at the cost of reduced spatial resolution. The objective of this work is to include thermal radiation in simulations of fires in both enclosures and open domains while maintaining a high resolution of convective transport. This is possible by modeling radiative transport in a way which retains the important effects relevant to the scenario of interest. For example, in a large fire within an enclosure, extended regions containing large amounts of soot and/or products may form. A radiation model which accounts for variable absorbtion is appropriate in this case. Thus, for enclosures, thermal radiation will be modeled by the P1 approximation equation which will be solved using a multigrid algorithm.